TECHNICAL REVIEW AND EVALUATION
OF APPLICATION FOR
AIR QUALITY PERMIT NO. 38250

I. INTRODUCTION

This Class II Air Quality Control Permit is for the operation of an Expandable Polystyrene Block Molding Facility owned and operated by StarRFoam Manufacturing, Inc. (StarRFoam). This is a new source permit.

A. Company Information

Facility Name:	StarRFoam Manufacturing, Inc. – EPS Block Molding Facility
Facility Address:	4555 Olympic Way Kingman, AZ 86401, Mohave County
Mailing Address:	1100 North Commerce Fort Worth, TX 76106

B. Attainment Classification

This facility is in an Attainment Area with respect to all the criteria pollutants.

II. FACILITY DESCRIPTION

A. Process Description

StarRFoam Manufacturing, Inc. (StarRFoam) will construct and operate an expandable polystyrene (EPS) block molding facility in the Kingman Airport Industrial Park at Kingman, Arizona. The foam blocks are used for a variety of purposes such as insulation, architectural shapes and panel cores. StarRFoam estimates that the facility will utilize 5,000 lbs of EPS beads on an hourly basis and 10 million pounds of EPS beads on an annual basis. Actual foam block production values vary depending on the density of the type of foam block that is being produced.

Production of EPS foam blocks consists of five steps: pre-expansion, pre-puff aging, block molding, block storage, and block storage/fabrication. Introduction of beads into the pre-expander, transferring the beads to the fluidized bed dryer, pre-puff aging, block molding, block storage and block storage/fabrication is referred to as "in process".

Pre-Expansion: EPS beads are received in airtight containers to maintain the expansion agent (up to seven percent pentane) that is impregnated into the beads. The containers remain tightly sealed until they are ready to be introduced into the pre-expander via the raw bead hopper. In the pre-expander, the beads are exposed to low-pressure steam provided by the thermal oxidizer with waste heat boiler, where they soften and expand to the desired density. At this point, the beads are 20 to 60 times larger and are very fragile.

Pre-Puff Aging: Upon leaving the pre-expander, the beads are transferred to the fluidized bed dryer. The main purpose of the dryer is to gently move the expanded beads and delay entry into the air-conveying system until the expanded beads stabilize. The air

entering the system continues to travel to the pentane accumulation permanent total enclosure (PAPTE), as does the air from the pre-expander after it leaves the condenser. The EPS beads are air-conveyed to the PAPTE, which contains large holding (aging) bags. The beads remain in these bags until the pentane remaining is reduced to the level needed for molding the material into blocks (typically between 2 and 3 percent). It is important to note that the PAPTE is sized to ensure that the concentration of pentane will not exceed 25 percent of the lower explosive limit.

Block Molding: EPS beads from the holding bags are air-conveyed to the block mold with the make-up air coming from the top of the PAPTE. After the mold is filled with beads and locked, steam is injected into the mold. This causes the beads to soften and expand further by vaporizing more of the pentane remaining in the matrix and fusing the beads together to foam a solid block. The spent steam and pentane-laden air then goes through the condenser and into the PAPTE. The block remains inside the mold and is vacuum cooled to remove excess pentane, which is then sent to the PAPTE.

Block Storage: Once the production process is completed, the blocks are stored in an enclosed block storage room for the first 24 hours after molding before being moved into the foam fabrication area. The miniscule amount of pentane left in the blocks at this point is difficult to evaluate. With the modern equipment that is proposed for the facility, pentane collection is inherently part of the design.

Block storage / fabrication: In the fabrication area, the foam blocks are cut or sliced into various sizes and shapes.

B. Air Pollution Control Equipment:

The facility utilizes a thermal oxidizer on the waste heat boiler to reduce emissions.

Pentane Emission Control Equipment: The pentane emitted during the pre-expansion, drying, and storage inside the PAPTE varies depending on several factors including temperature, desired density, and the manufacturer of the EPS.

In total, at least 90 percent of the pentane emissions released during the first four process steps (pre-expansion, pre-puff aging, block molding, and block storage) are routed to the thermal oxidizer with waste heat boiler. Because pentane is 2 ½ times heavier than air, it settles to the floor allowing it to be more easily routed from the floor to the oxidizer. Any un-captured pentane emissions are released as fugitive emissions.

III. LIMITATIONS ON PTE

The facility is limited to expandable poly styrene (EPS) bead usage of 5,000 pounds / hour or 10,000,000 pounds / year.

IV. EMISSIONS

The emission calculations for the permit review process relied upon emission factors derived from the Environmental Protection Agency's (EPA) Compilation of Air Pollution Emission Factors (5th Edition).

Table 1: Facility Emissions

Pollutant	Emission *(tons/year)*
NO_X	4.12
CO	3.46
PM_{10}	0.313
SO_X	0.025
VOC	80.2
HAPs	0.78

V. APPLICABLE REGULATIONS

The applicable regulations were identified by the Department as part of the permitting process. If necessary, the source is required to list any additional regulations that may be applicable.

Table 2: Verification of Applicable Regulations

Unit	Date of Constr./Mod.	Control Device	Rule	Verification
Thermal Oxidizer with waste heat Boiler	2001	None	A.A.C. R-18-2-724	The boilers are subject to Standards of Performance for Fossil-fuel Fired Industrial and Commercial Equipment, A.A.C. R18-2-724.
Back-up Boiler	1972			
Fugitive dust sources	N/A	Water and other reasonable precautions.	Article 6 of the AAC	These standards are applicable to all fugitive dust sources.
Mobile sources	N/A	Water Sprays/Water Truck for dust control	Article 8 of the AAC	Opacity requirements for smoke and dust for mobile sources (construction equipment, etc.).

VI. MONITORING AND RECORDKEEPING REQUIREMENTS

A. Boiler

1. Monitoring Requirements

Opacity Monitoring Requirements

The permit requires monthly surveys of visual emissions from the boiler stacks to be performed by a certified Method 9 observer. If the opacity of the emissions observed appears to exceed the standard, the observer is required to conduct a certified EPA Reference Method 9 observation.

2. Recordkeeping Requirements

a. The Permittee is required to keep records of fuel supplier certifications to demonstrate compliance with the PM limit. The certification must contain information regarding the name of fuel supplier and lower heating value of the fuel.

b. Opacity

The Permittee is required to record the emission point being observed, location of the observer, date, time and the results of all visible emission surveys or Method 9 observation made monthly, as well as the name of the observer who conducted the test. In the event of opacity going beyond the limit, the Permittee must keep a record of the corrective action taken to bring the opacity below the standard.

B. Fugitive Dust

1. Monitoring Requirements

Opacity

The permit requires quarterly EPA Reference Method 9 of fugitive emissions by a certified Method 9 observer.

2. Recordkeeping Requirements

The Permittee is required to record the emission point being observed, location of the observer, date, time and the results of all observations made, as well as the name of the observer who conducted the test. In the event of opacity going beyond the limit, the Permittee must keep a record of the corrective action taken to bring the opacity below the standard.

VII. TESTING REQUIREMENTS

A. Pentane Accumulation Permanent Total Enclosure

The Permittee is required to demonstrate that the Permanent Total Enclosure meets the 4-point criteria. The 4 point criteria are used to determine if an existing building or enclosure meets the requirements of permanent total enclosure. If the 4 point criteria are met and if the exhaust gases from the enclosure are ducted to the control device then it is assumed that the VOC capture efficiency is 100%. This design verification shall be performed annually and the results shall be reported to ADEQ.

B. Thermal Oxidizer

The Permittee is being required to conduct performance tests once every two years for VOC emissions from the stack of the oxidizer, in accordance with Reference Method 25A in 40 CFR 51. During the test, the press production rate, outlet temperature and the gas volumetric

flow rate will be monitored and recorded. The test will serve to determine if the thermal oxidizer satisfies the required 98 percent VOC destruction efficiency.

VIII. IMPACTS TO AMBIENT AIR QUALITY

A. Introduction

As part of StarRFoam's Class II permit application, ADEQ has evaluated the air quality impact analysis (i.e. modeling analysis, SCREEN 3) completed by the source. The air quality impact analysis considers operation of the Thermal Oxidizer with Waste Heat Boiler, the Back-Up Boiler and fugitive pentane emissions from rooftop exhaust

The purpose of the modeling analysis is to determine whether air quality impacts from proposed criteria pollutant and hazardous air pollutant (HAP) emissions will cause or contribute to a violation of any air quality standard, or worsen an existing air quality problem. Applicable standards and guidelines include the National Ambient Air Quality Standards (NAAQS) and the Arizona Ambient Air Quality Guidelines (AAAQG).

B. Modeling Analysis Overview

1. NAAQS Analysis

Table 3 below shows the results of the NAAQS analysis performed for the Criteria Pollutants to determine if StarRFoam's proposed facility would exceed National Ambient Air Quality Standards. All pollutants are within the National Ambient Air Quality Standards.

Table 3: NAAQS Modeling Analysis Results

Pollutant		Concentration (µg/m^3)					NAAQS (µg/m3)	% of NAAQS
		Thermal Oxidizer	Back Up Boiler	Rooftop Emissions	Background (see notes)	Total		
NO_2	Annual	1.27	15.8	- -	4.00	21.10	100	21.11%
CO	1 hour	13.3	166	- -	582.00	762.00	40,000	1.90%
	8 hour	9.34	116	- -	582.00	708.00	10,000	7.08%
PM_{10}	24 hr	0.483	6.02	- -	46.00	52.50	150	35.00%
	Annual	0.0965	1.2	- -	14.00	15.30	50	30.60%
SO_2	3 hour	0.0857	1.07	- -	246.00	247.00	1,300	19.01%
	24 hour	0.0381	0.475	- -	52.00	52.50	365	14.39%
	Annual	7.62E-03	0.095	- -	6.00	6.10	80	7.63%
Pb	Quarter	1.03E-05	1.29E-04	- -	0.04	0.04	1.5	2.68%

Notes: NO_2 - Long-term average value (0.002 ppm) of several monitors located near power plants in rural areas of Arizona
CO - Typical continental ambient background value (0.5 ppm) used in most regional models
PM_{10} - Average max. values over 3-year period from Kingman - Praxair monitoring station (Mohave County)
SO_2 - Max. values over 3-year period from Bullhead City -SCE monitoring station (Mohave County)
Pb - Lead background value is the maximum 2001 quarterly mean for EPA Region 9, from www.epa.gov/airtrends/lead2.html

2. AAAQG Analysis

Table 4 indicates AAAQG Analysis performed for the pollutants of concern to determine if StarRFoam's proposed facility would be expected to exceed ADEQ's guideline concentrations. All pollutants are expected to be below the Arizona Ambient Air Quality Guidelines.

Table 4: AAAQG Modeling Analysis Results

Pollutant	Averaging Time	Thermal Oxidizer with Waste Heat Boiler ($\mu g/m^3$)	Back Up Boiler ($\mu g/m^3$)	Rooftop Exhaust ($\mu g/m^3$)	Total ($\mu g/m^3$)	AAAQG ($\mu g/m^3$)	% of AAAQG
Arsenic *	1-hr	3.18E-05	3.96E-04	- - -	4.28E-04	2.80E-01	0.15%
	24-hr	1.27E-05	1.58E-04	- - -	1.71E-04	7.30E-02	0.23%
	Annual	2.54E-06	3.17E-05	- - -	3.42E-05	2.00E-04	17.11%
Barium	1-hr	6.99E-04	8.71E-03	- - -	9.41E-03	1.50E+01	0.06%
	24-hr	2.79E-04	3.48E-03	- - -	3.76E-03	4.00E+00	0.09%
Benz(a)anthracene *	1-hr	2.86E-07	3.56E-06	- - -	3.85E-06	7.90E-01	0.00%
	24-hr	1.14E-07	1.43E-06	- - -	1.54E-06	2.10E-01	0.00%
	Annual	2.29E-08	2.85E-07	- - -	3.08E-07	5.70E-04	0.05%
Benzene *	1-hr	3.33E-04	4.16E-03	- - -	4.49E-03	6.30E+02	0.00%
	24-hr	1.33E-04	1.66E-03	- - -	1.80E-03	5.10E+01	0.00%
	Annual	2.67E-05	3.33E-04	- - -	3.59E-04	1.40E-01	0.26%
Benzo(a)pyrene *	1-hr	1.91E-07	2.38E-06	- - -	2.57E-06	7.90E-01	0.00%
	24-hr	7.62E-08	9.50E-07	- - -	1.03E-06	2.10E-01	0.00%
	Annual	1.52E-08	1.90E-07	- - -	2.05E-07	5.70E-04	0.04%
Beryllium *	1-hr	1.91E-06	2.38E-05	- - -	2.57E-05	6.00E-02	0.04%
	24-hr	7.62E-07	9.50E-06	- - -	1.03E-05	1.60E-02	0.06%
	Annual	1.52E-07	1.90E-06	- - -	2.05E-06	5.00E-04	0.41%
Cadmium *	1-hr	1.75E-04	2.18E-03	- - -	2.35E-03	1.70E+00	0.14%
	24-hr	6.99E-05	8.71E-04	- - -	9.41E-04	1.10E-01	0.86%
	Annual	1.40E-05	1.74E-04	- - -	1.88E-04	2.90E-04	64.89%
Chromium *	1-hr	2.22E-04	2.77E-03	- - -	2.99E-03	1.10E+01	0.03%
	24-hr	8.89E-05	1.11E-03	- - -	1.20E-03	3.80E+00	0.03%
Copper (fume)	1-hr	1.35E-04	1.68E-03	- - -	1.82E-03	2.30E+00	0.08%
	24-hr	5.40E-05	6.73E-04	- - -	7.27E-04	7.50E-01	0.10%
Dibenzo(a,h)anthracene *	24-hr	7.62E-08	9.50E-07	- - -	1.03E-06	2.10E-01	0.00%
	Annual	1.52E-08	1.90E-07	- - -	2.05E-07	5.70E-04	0.04%
Dichlorobenzene * (25321-22-6 mixed isomers)	1-hr	1.91E-04	2.38E-03	- - -	2.57E-03	2.50E+02	0.00%
	24-hr	7.62E-05	9.50E-04	- - -	1.03E-03	6.60E+01	0.00%
	Annual	1.52E-05	1.90E-04	- - -	2.05E-04	1.80E-01	0.11%
Formaldehyde *	1-hr	1.19E-02	1.48E-01	- - -	1.60E-01	2.00E+01	0.80%
	24-hr	4.76E-03	5.94E-02	- - -	6.41E-02	1.20E+01	0.53%
	Annual	9.53E-04	1.19E-02	- - -	1.28E-02	8.00E-02	16.04%
Hexane *	1-hr	2.86E-01	3.56E+00	- - -	3.85E+00	5.30E+03	0.07%
	24-hr	1.14E-01	1.43E+00	- - -	1.54E+00	1.40E+03	0.11%
Manganese (fume) *	1-hr	6.03E-05	7.52E-04	- - -	8.13E-04	2.50E+01	0.00%
	24-hr	2.41E-05	3.01E-04	- - -	3.25E-04	8.00E+00	0.00%
Mercury *	1-hr	4.13E-05	5.15E-04	- - -	5.56E-04	1.50E+00	0.04%
	24-hr	1.65E-05	2.06E-04	- - -	2.22E-04	4.00E-01	0.06%
Naphthalene *	1-hr	9.69E-05	1.21E-03	- - -	1.30E-03	6.30E+02	0.00%
	24-hr	3.87E-05	4.83E-04	- - -	5.22E-04	4.00E+02	0.00%
Nickel (fume) *	1-hr	3.33E-04	4.16E-03	- - -	4.49E-03	5.70E+00	0.08%
	24-hr	1.33E-04	1.66E-03	- - -	1.80E-03	1.50E+00	0.12%
	Annual	2.67E-05	3.33E-04	- - -	3.59E-04	4.00E-03	8.98%
	24-hr	1.65E-01	2.06E+00	3.30E+03	3.30E+03	3.50E+03	94.26%

Pollutant	Averaging Time	Thermal Oxidizer with Waste Heat Boiler (µg/m3)	Back Up Boiler (µg/m3)	Rooftop Exhaust (µg/m3)	Total (µg/m3)	AAAQG (µg/m3)	% of AAAQG
Pentane	1-hr	4.13E-01	5.15E+00	8.24E+03	8.25E+03	1.30E+04	63.45%
	24-hr	1.65E-01	2.06E+00	3.30E+03	3.30E+03	3.50E+03	94.26%
Propane	24-hr	2.54E-01	1.27E+00	- - -	1.52E+00	1.40E+04	0.01%
Selenium *	1-hr	3.05E-07	4.75E-05	- - -	4.78E-05	6.00E+00	0.00%
	24-hr	1.22E-07	1.90E-05	- - -	1.91E-05	1.60E+00	0.00%
Toluene *	1-hr	5.40E-04	6.73E-03	- - -	7.27E-03	4.70E+03	0.00%
	24-hr	2.16E-04	2.69E-03	- - -	2.91E-03	3.00E+03	0.00%
Vanadium	1-hr	3.65E-04	4.55E-03	- - -	4.92E-03	1.50E+00	0.33%
	24-hr	1.46E-04	1.82E-03	- - -	1.97E-03	4.00E-01	0.49%

* also a HAP

VIII. LIST OF ABBREVIATIONS

AAAQG…….Arizona Ambient Air Quality Guideline
A.A.C……..Arizona Administrative Code
ADEQ……..Arizona Department of Environmental Quality
CO…..... carbon monoxide
EPA…….Environmental Protection Agency
EPS..... expandable polystyrene beads
HAP……... Hazardous Air Pollutant
hr .....hour
NAAQS……..National Ambient Air Quality Standard
NO_x…….. nitrogen oxides
PAPTE ..... pentane accumulation permanent total enclosure
PM……. particulate matter
PM_{10}…..…… particulate matter less than 10 microns
PTE……. potential to emit
SO_2 …….. sulfur dioxide
$\mu g/m^3$..... micro grams per cubic meter
VOC..……..... volatile organic compounds
yr……..... year